

## University of Massachusetts Amherst ScholarWorks@UMass Amherst

---

Cranberry Station Extension meetings

Cranberry Station Outreach and Public Service  
Activities

---

2009

# Research Update Meeting 2009 - Cranberry Station Update

Carolyn J. DeMoranville

*University of Massachusetts - Amherst*, [carolynd@umext.umass.edu](mailto:carolynd@umext.umass.edu)

Follow this and additional works at: [https://scholarworks.umass.edu/cranberry\\_extension](https://scholarworks.umass.edu/cranberry_extension)

 Part of the [Horticulture Commons](#)

---

### Recommended Citation

DeMoranville, Carolyn J., "Research Update Meeting 2009 - Cranberry Station Update" (2009). *Cranberry Station Extension meetings*. 33.

Retrieved from [https://scholarworks.umass.edu/cranberry\\_extension/33](https://scholarworks.umass.edu/cranberry_extension/33)

This Article is brought to you for free and open access by the Cranberry Station Outreach and Public Service Activities at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Cranberry Station Extension meetings by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact [scholarworks@library.umass.edu](mailto:scholarworks@library.umass.edu).



# Cranberry Station Update

Carolyn DeMoranville, Director  
UMass Amherst Cranberry Station



# Grower support

- Grower grant sources

- Cape Cod Cranberry Growers Association
- Cranberry Research Foundation
- Cranberry Institute
- Ocean Spray
- Wisconsin Cranberry Board

- 2008 - \$71,340

- In-kind contributions and gifts in 2008

- \$17,350



# Grant support – mostly competitive government funding

- Hatch Funds from UMass Ag Experiment Station
- IR-4 – support for minor use pesticide registrations
- USDA: NE-IPM, SARE
- Industry (chemical companies)
- MDAR – Ag innovations
  
- Current value of all active grants - ~\$2.2 million
- New awards in 2008 - ~\$800,000
  
- Grant review for past 4 years in the handout



# University support

## ● Amherst

- Faculty salaries
- Support staff (office, bog)
- Operations (utilities, etc.)

## ● Dartmouth

- Technical support for Peter's program

## ● Central administration/Amherst

- Operating funds



# Thanks for the support

- CCCGA, Cranberry Research Foundation
- Ocean Spray
- Cranberry Institute
- Industry contributors
  - grants
  - meeting support – see the poster near the coffee
- Individual grower cooperators and donors





# Phosphorus Management and Reduction Implementation

Carolyn DeMoranville  
UMass Amherst Cranberry Station



# Why P reduction?

- Pollution concerns for fresh water
- Clean Water Act mandated TMDL process
- P is expensive – we need to use only enough to assure that the plants have what they need

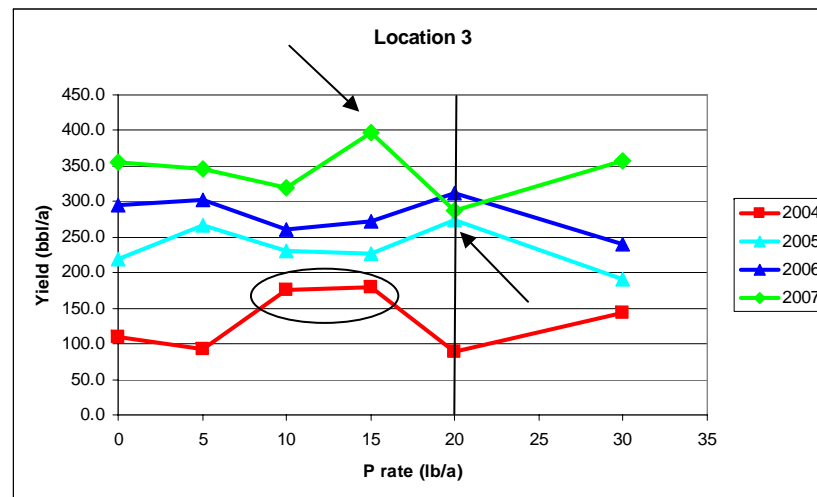
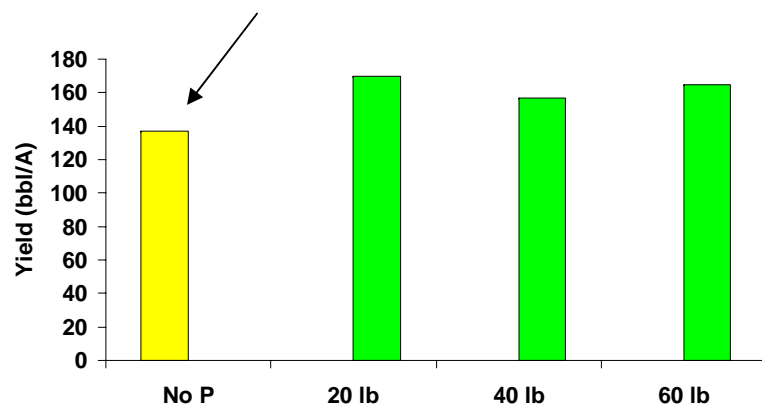




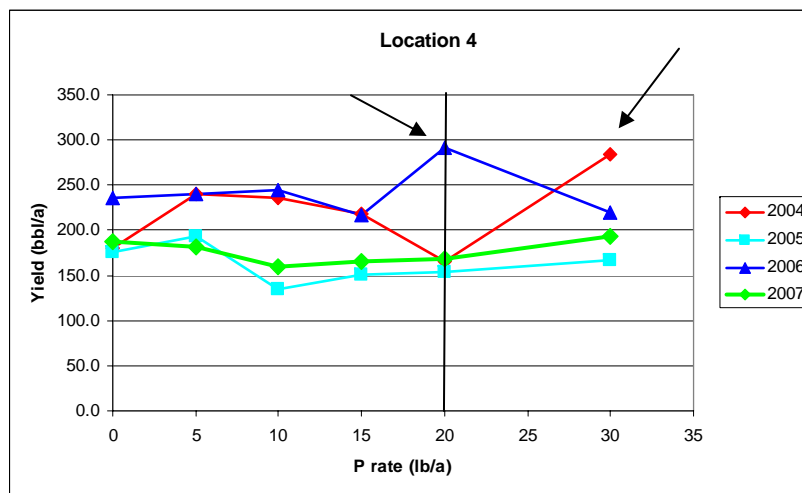
# Background

- Actual P requirement based on plant composition/  
growth is low
  - “trash” plus 200 bbl crop removes 4.2 lb P/acre
- Soil testing is problematic for planning due to lack of  
calibration ability – acid soils
- Tissue testing should be a better tool (established  
standard value of 0.1 to 0.2%)
- For best planning, a target P application range should  
also be established





Tissue P in normal range

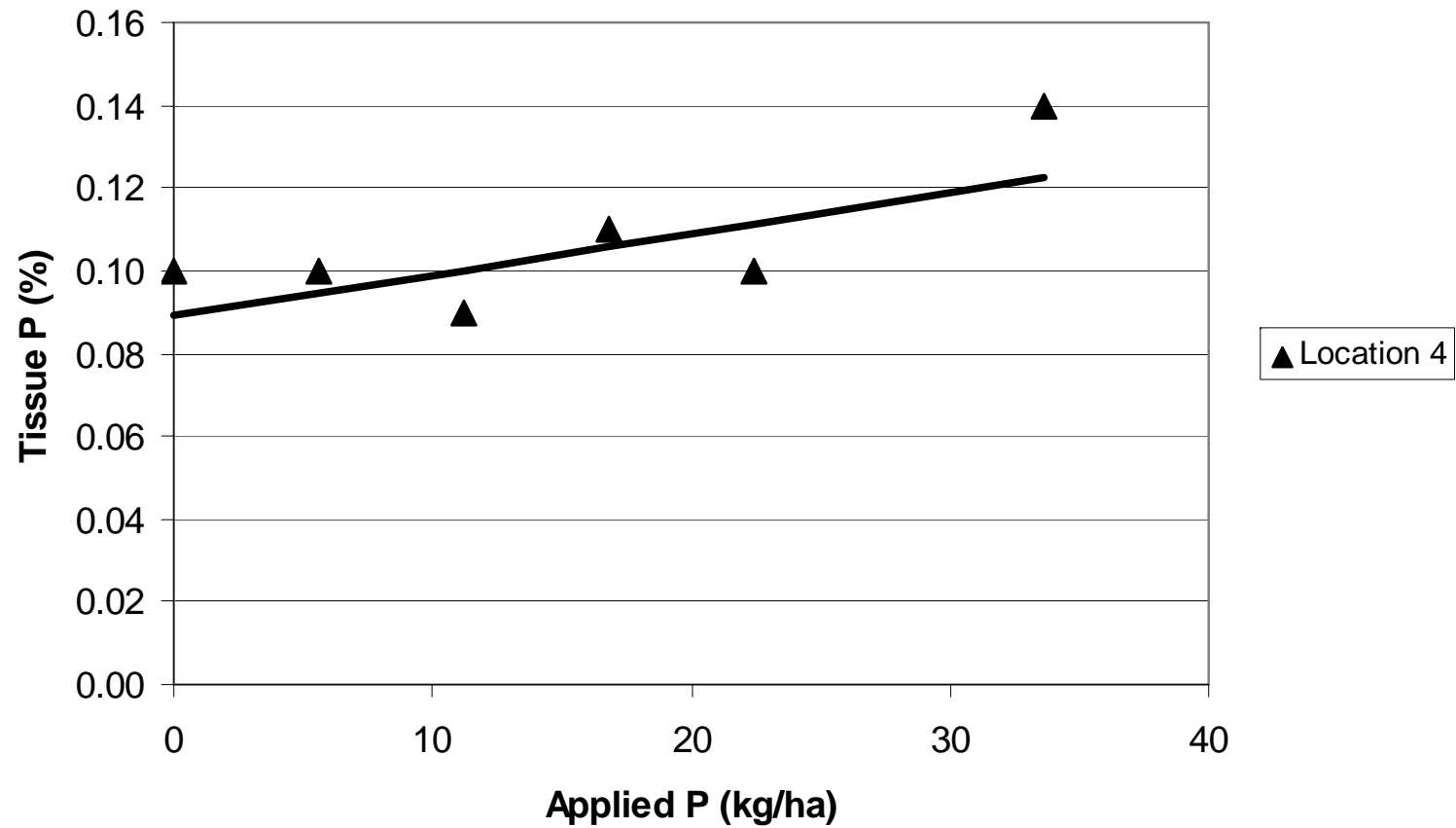


Tissue P below normal range



# Tissue P

(2006 regression data)



# Summary – recent field plots

- Trends indicate that some P may be better than no P, although not much of a rate response
- At one location P in the tissue was below the standard range and there was a response to >20 lb P/acre
- Further justification for a target P rate of no more than 20 lb P/acre and some justification for lower rate consideration



# Fertilizer and yield – whole bog comparison

(P in lb·a<sup>-1</sup>; Yield in bbl·a<sup>-1</sup>)

	<u>Site 1</u>		<u>Site 2</u>	
<u>Year</u>	<u>P rate</u>	<u>Yield</u>	<u>P rate</u>	<u>Yield</u>
2002	17.8	117	24.9	117
2003	14.4	119	22.3	119
2004	5.6	172	17.3	196
2005	16.5	190	24.0	121
2006	6.4	163	5.7	244
2007	10.4	156	11.4	136
pre-reduction	17.8	117	22.1	138
post-reduction	10.7	160	8.6	190



# Fertilizer and yield – whole bog comparison

(P in lb·a<sup>-1</sup>; Yield in bbl·a<sup>-1</sup>)

	<u>Site 3</u>		<u>Site 4</u>	
<u>Year</u>	<u>P rate</u>	<u>Yield</u>	<u>P rate</u>	<u>Yield</u>
2002	28.8	221	35.5	[65]*
2003	19.8	136	32.4	150
2004	21.2	218	28.0	277
2005	26.1	134	24.8	159
2006	7.1	256	12.9	286
2007	14.7	197	16.7	252
pre-reduction	28.8	221	30.2	195
post-reduction	17.8	188	14.8	269



\* Insect infestation at this site in 2002



Site 3 has biennial trends so we looked at 2-year periods

<u>Site</u>	<u>Avg. Yield (bbl·a<sup>-1</sup>)</u>		
	<u>2001- 2002</u>	<u>2003- 2004</u>	<u>2005- 2006</u>
3	187	177	196



	<u>Avg. Fertilizer P (lb·a<sup>-1</sup>)</u>		
	<u>2002</u>	<u>2003- 2004</u>	<u>2005- 2006</u>
	28.8	20.5	16.6



## Cranberry Bog Total Phosphorus – water quality

	TP Fertilization (lb·a <sup>-1</sup> /yr)	TP incoming (lb·a <sup>-1</sup> /yr)	TP leaving (lb·a <sup>-1</sup> /yr)	TP export (net) (lb·a <sup>-1</sup> /yr)
Bog ID	Mean 2003-04			
1	10.0	0.5	2.0	1.5
2	19.8	1.9	4.6	2.7
3	20.5	2.1	1.5	-0.6
4	38.0	1.9	1.7	-0.2





# Impact of P reduction on quality of flood discharge water

<u>mean mg·L<sup>-1</sup> TP in flood discharges</u>					
<u>Site</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2007*</u>
1	0.377	0.424	0.237	0.097	0.157
2	0.384	0.439	0.528	0.408	
3	0.100	0.170	0.118		
4	0.109	0.127	0.147		

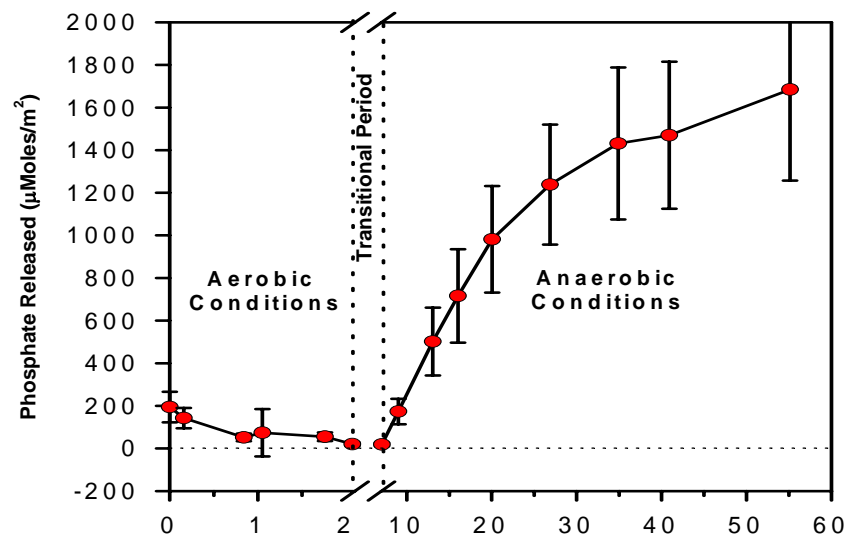
↑  
reduction



\*Limited sample set



Time Course of Phosphate Release  
Natural Bog

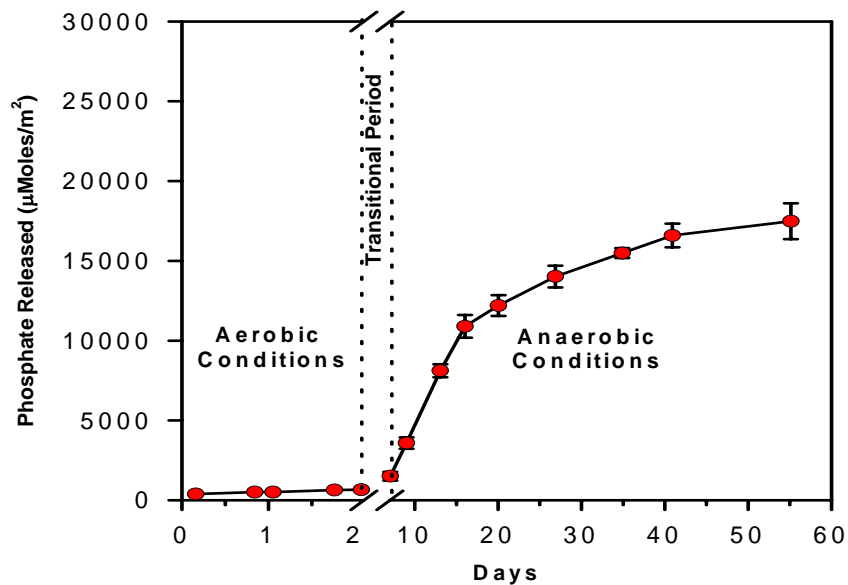


Native bog

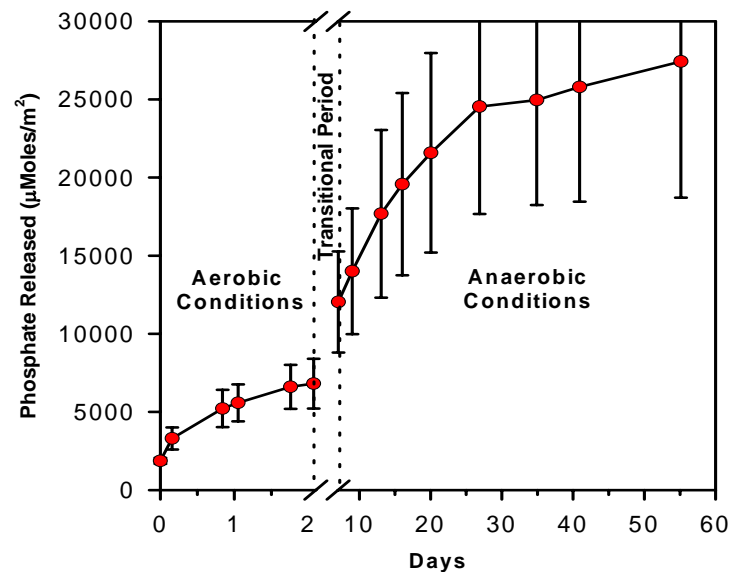
10-18 lb·a<sup>-1</sup> P

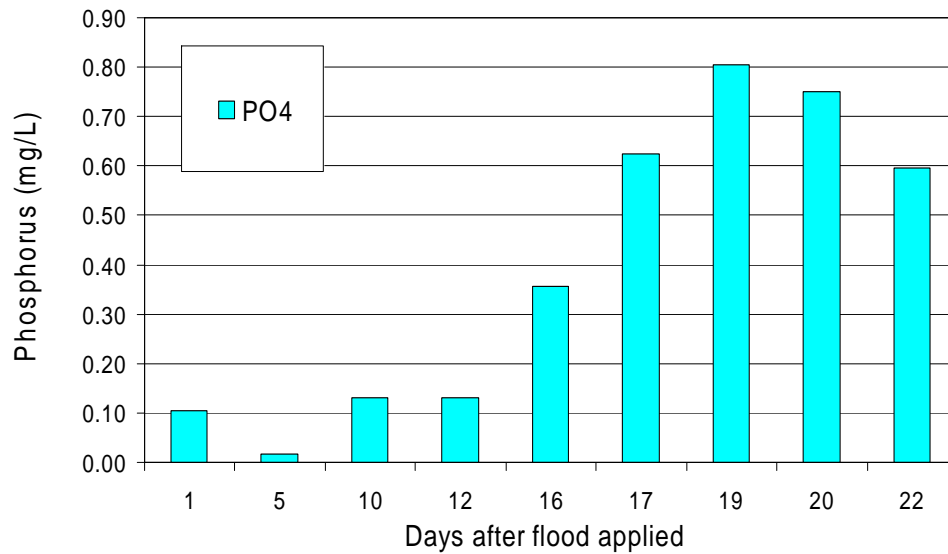
>20 lb·a<sup>-1</sup> P

Time Course of Phosphate Release  
Low P Application



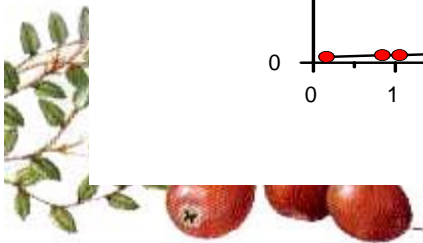
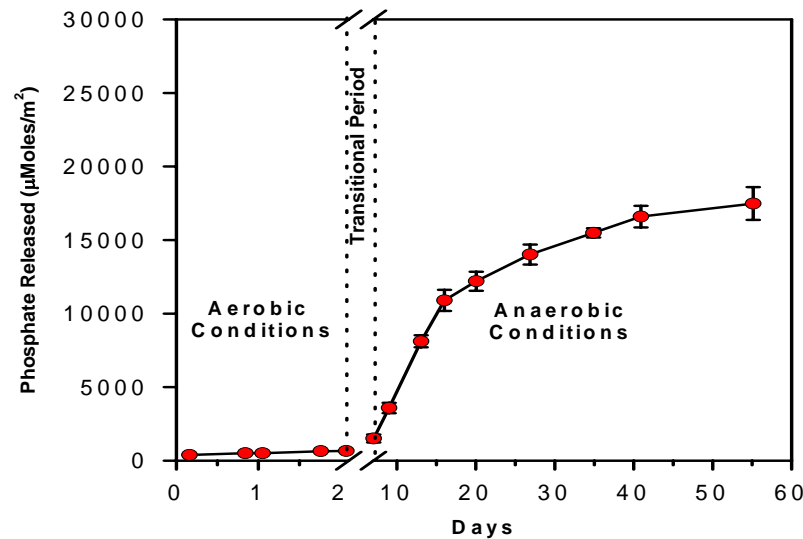
Time Course of Phosphate Release  
High P Application





- Laboratory results were similar to those in water collected from a harvest flood

Time Course of Phosphate Release  
Low P Application



# BMP recommendations

- Apply no more than  $20 \text{ lb} \cdot \text{a}^{-1} \text{ P}$  per season
  - Based on the laboratory study, highest risk for P mobilization - bogs receiving  $>20 \text{ lb} \cdot \text{a}^{-1} \text{ P}$
- Allow particles to settle prior to discharge of harvest flood but do not hold the flood for more than  $\sim 10$  days



## Recommendation to use no more than 20 lb/a P Monitor outcomes when using less

- Generally, in the year of application, the crop can recover 10-30% of that applied
- A 200 bbl crop (with harvest trash) removes 4.2 lb/acre
- Use tissue testing along with yield monitoring



# Tissue standard is 0.1-0.2% P

<0.1% --- increase P rate and retest next year

0.1 – 0.11% -- stay the course but retest next year

0.12 – 0.15% -- test again in 2-3 years

0.16% or greater – test again in 3-4 years



# Fertilizer choices and P reduction

## ● High P ratio

- 5-15-30
- 3-13-26
- 12-24-12
- 6-24-24
- 8-32-16

## ● Low P ratio

- 15-15-15, 13-13-13
- 15-15-20
- 10-12-24
- 18-8-18
- 15-10-18
- 16-15-21
- 5-5-20 (alternative with low N)

Advantage of 18-8-18:

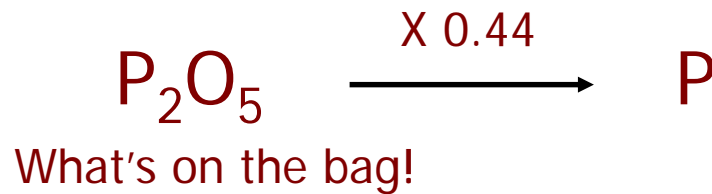
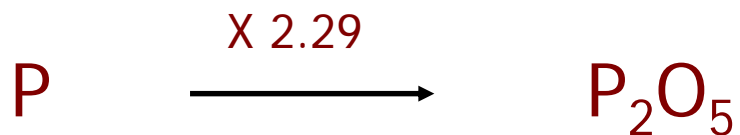
Fewer pounds to apply (based on N requirement)

Lower application cost



# Calculations

- The number on the bag is not actual P!!





# Calculations

## ● Example #1 – 45 lb N

I used 375 lb/acre 12-24-12 – how much P?

$$375 \times 0.24 \times 0.44 = 39.6 \text{ lb/acre}$$

0.24 is the bag number converted to a decimal

0.44 converts  $P_2O_5$  to actual P



# Calculations

## ● Example #2 – 45 lb N

I used 250 lb/acre 18-8-18 – how much P?

$$250 \times 0.08 \times 0.44 = 8.8 \text{ lb/acre}$$

0.08 is the bag number converted to a decimal

0.44 converts  $P_2O_5$  to actual P



# Calculations

## ● Example #3 – 45 lb N

I used 300 lb/acre 15-15-15 – how much P?

$$300 \times 0.15 \times 0.44 = 19.8 \text{ lb/acre}$$

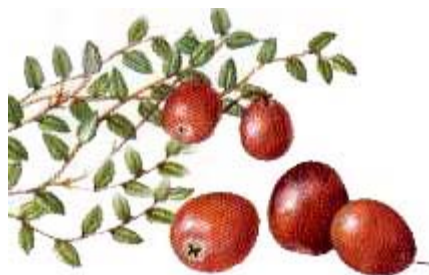
0.15 is the bag number converted to a decimal

0.44 converts  $P_2O_5$  to actual P



# Summary

Material used	Pounds applied	Pounds N per acre	Pound P per acre
12-24-12	375	45	40
18-8-18	250	45	9
15-15-15	300	45	20



Set fertilizers: Max N applied to maintain  $P < 20$  lb/acre

Material used	Pounds P per acre	Pounds fertilizer	Pounds N per acre
12-24-12	20	188	22.5
18-8-18	20	568	102
10-12-24	20	379	38
15-10-18	20	454	68
15-15-15	20	300	45
19-19-19	20	235	45

## Low N materials – how much P in 100 lbs.

Material used	Pounds fertilizer	Pounds N per acre	Pounds P per acre
3-13-26	100	3	5.7
5-15-30	100	5	6.6
5-10-10	100	5	4.4
6-24-24	100	6	10.6
8-32-16	100	8	14.1
5-5-20	100	5	2.2



Questions?





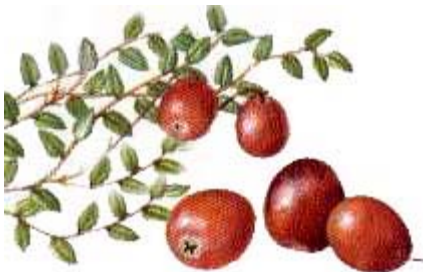
# Sanding and Pruning

## SARE Project

C. DeMoranville, H. Sandler, J. Vanden Heuvel,

A. Averill, M. Sylvia, F. Caruso, B. Suhayda

UMass Amherst Cranberry Station





# Side - by – Side Comparisons

- Sanding, followed by pruning at some set interval
  - 2 yr, 3 yr, or 4 yr+



## Treated in 2006 – Evaluated in 2006 and 2007

<u>Location</u>	<u>Years since sand</u>	<u>Pruned?</u>	<u>Yield</u>	<u>Yield - following year</u>	<u>Cumulative yield</u>	<u>density year of pruning</u>	<u>density year after</u>
Site #2	2	Yes	230	361	591	108	132
	2	No	333	188	521	106	112
Site #3	2	Yes	319	324	643	97	107
	2	No	420	303	723	103	100
Site #5	2	Yes	320	289	609	99	85
	2	No	224	458	682	77	111
Site #1	3	Yes	298	297	595	110	94
	3	No	211	--	??	90	101
Site #4	3	Yes	455	383	838	101	127
	3	No	383	400	783	89	98
Site #7	4+	Yes	212	207	419	97	96
	4+	No	224	153	377	115	94



# Sanding vs. Pruning Experiment

Graduate Project

Brett Suhayda

C. DeMoranville and J. Vanden Heuvel, Advisors



# Levels

## ● Pruning

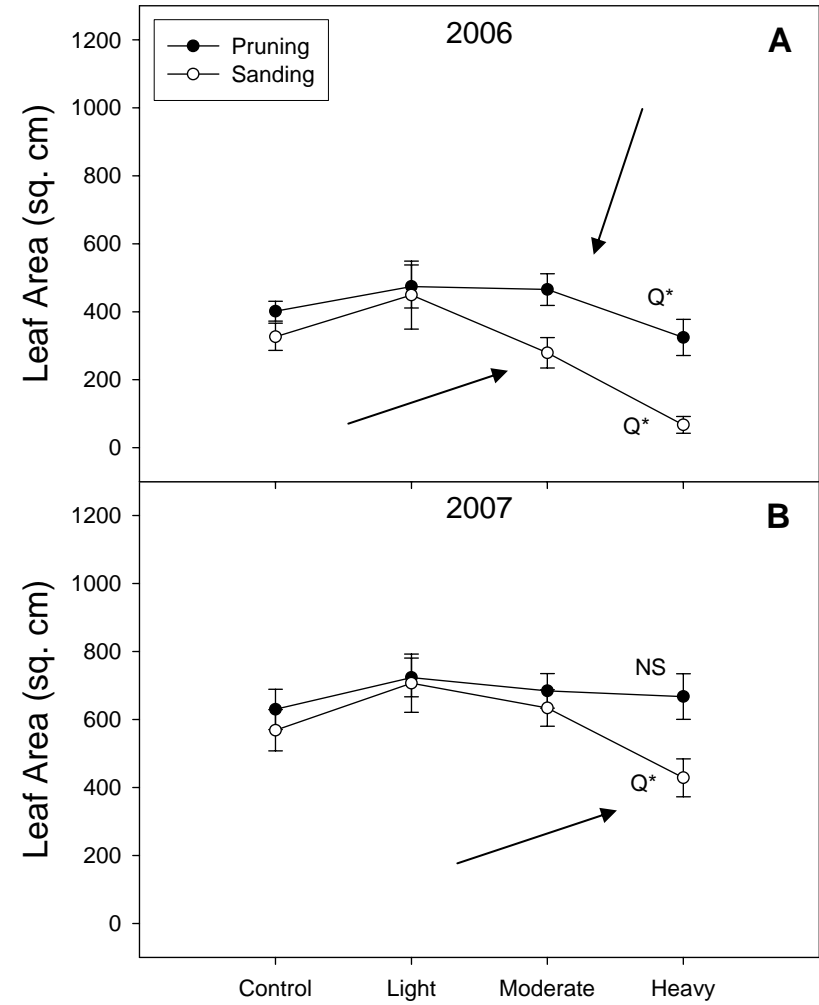
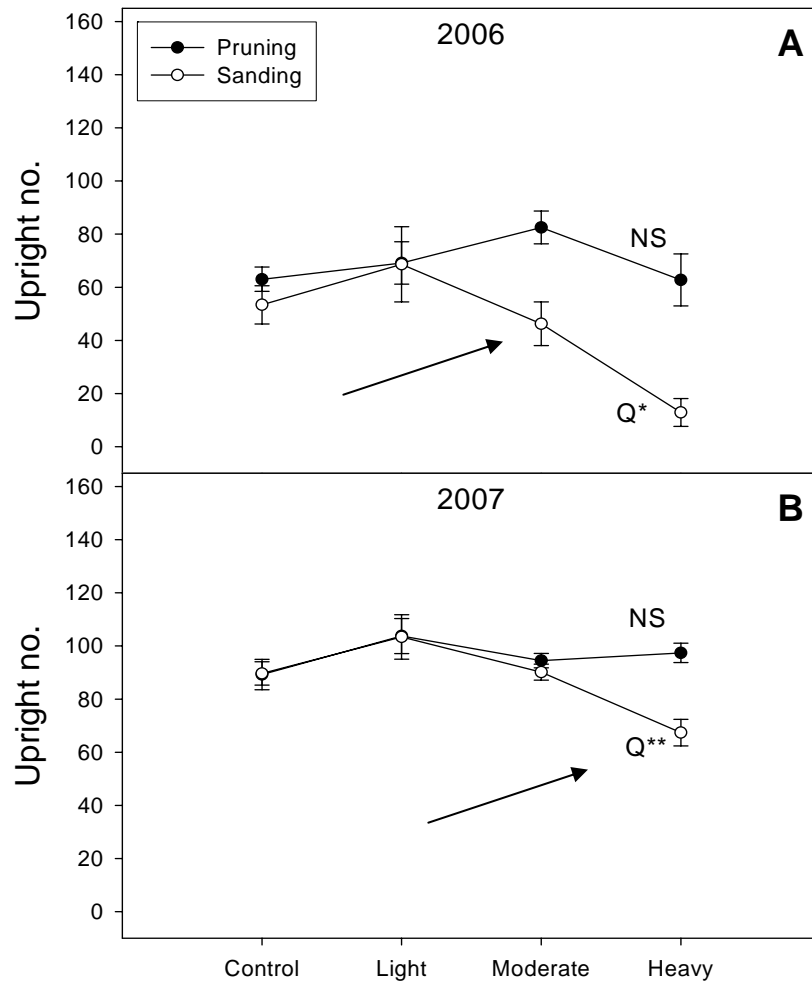
- Control (none)
- Light (single pass)
- Medium (2 passes)
- Heavy (3 passes)

## ● Sanding

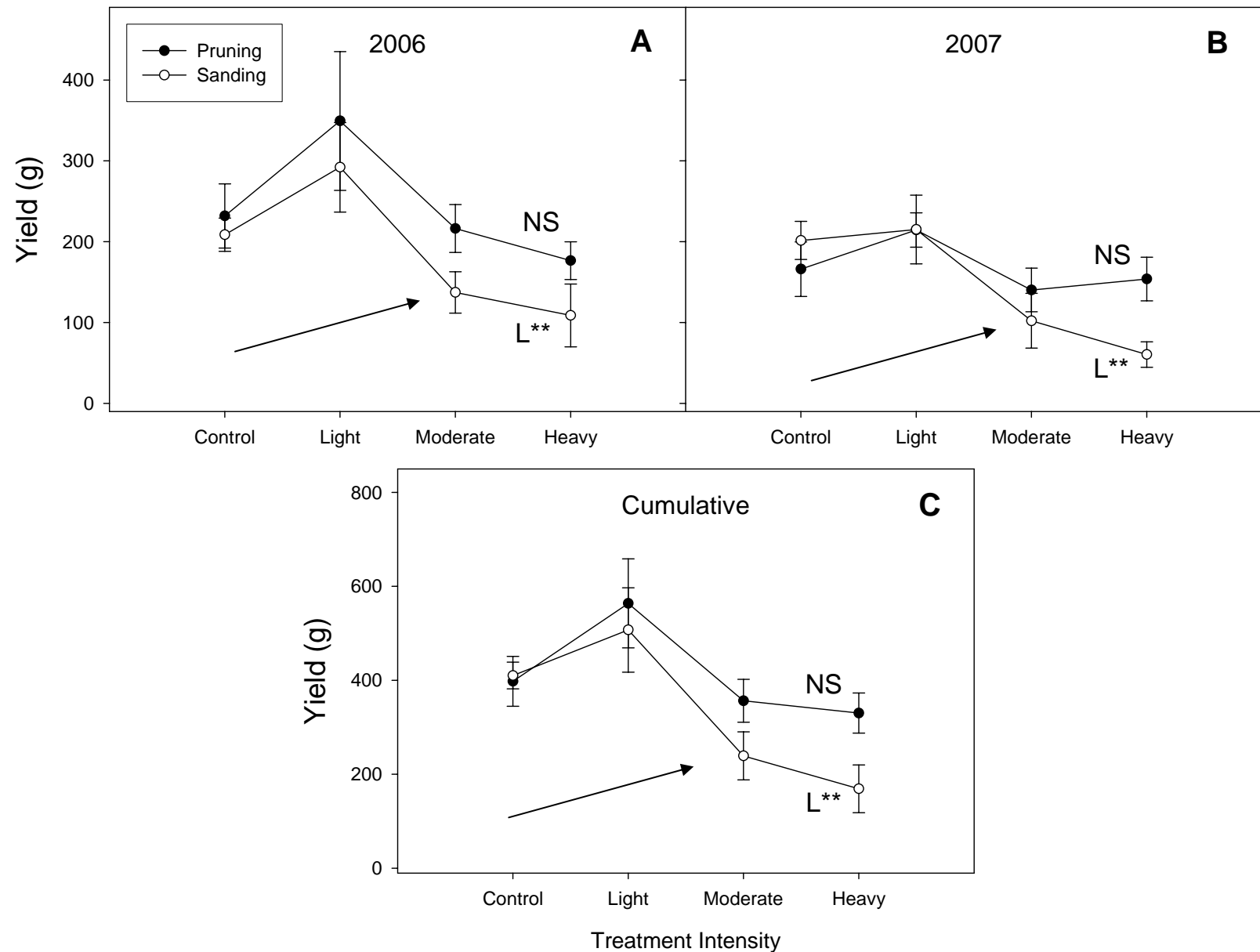
- Control (none)
- Light (1/2 inch)
- Medium (1 inch)
- Heavy (1.5 inch)



## Effect of '06 Sanding and Pruning on canopy

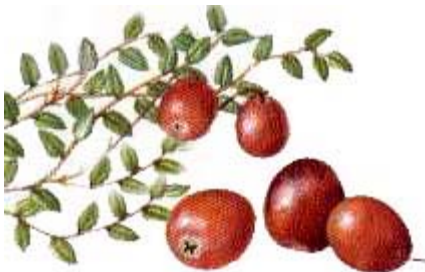


# Effect of '06 Sanding and Pruning on Yield



# Conclusions - yield

- In the first year, pruning treatments show higher yield than sanding (in foot square sampling)
- Low intensity treatment plots had best yield but after that yield declined with intensity
- By year 2, yield remained lower in two high intensity treatments – especially with sanding



# SARE Grower Survey

- Extensive survey in 2006
- Following up today with a second mini-survey







Questions?

